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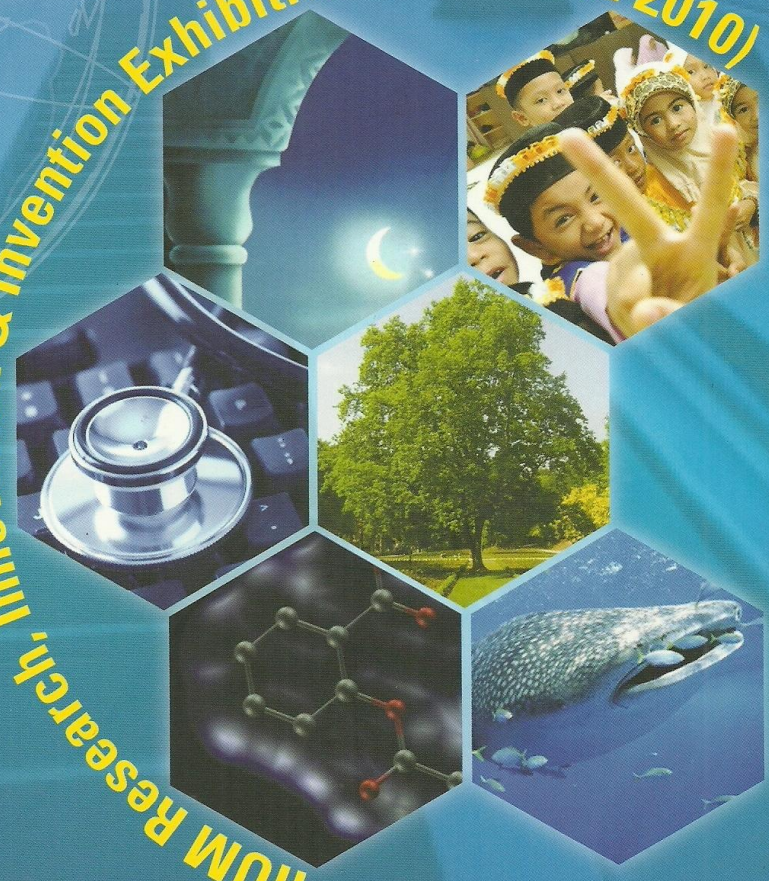

ENHANCING QUALITY RESEARCH &

INNOVATION for SOCIETAL DEVELOPMENT

PP-41 Immobilization of Cellulases Enzyme on Carbon Nanotubes (CNTs) for Cellulosic Compounds Degradation

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The fast growing palm oil industry in Malaysia generates, amongst other wastes, Empty Fruit Bunch (EFB) which consists of cellulosic materials. It is one of the major sources of Greenhouse Gases (GHG). However, the bioconversion of cellulosic materials in EFB, a renewable biomass, to valuable products will be the solution to the disposal problem and hence minimize the pollution. The bioconversion of cellulosic materials is carried out by using cellulase enzyme, which itself was extracted from sludge, immobilized on functionalized carbon nanotubes (CNTs) in the presence of coupling reagent. The process parameters such as reaction temperature, reaction time, pH, and amount of enzyme, CNTs dosage and EDC were optimized by using design expert software. The morphology and the structure of CNTs were characterized by Field Emission Scanning Electron Microscopy (FSEM) and Fourier Transform Infrared Absorption Spectroscopic (FTIR). Firstly, carbon nanotubes were functionalized by acidic treatment. Then, the cellulase enzyme is immobilized on the functionalized (CNTs) in a solution of N-hydroxysuccinimide (NHS) and 1-ethyl-3-(3-dimethylamino propyl)-carbodiimide hydrochloride (EDC). The amount of enzyme attached on (CNTs) will be measured through UV spectrometer to determine the cellulases catalytic activity after immobilization and compare it with the free enzyme. Finally, the immobilized enzyme will be tested in the degradation of cellulosic material of empty fruit bunch (EFB) from palm oil mill effluent.

PP-53 Recent Finding on Premature Failure of Commercial Electric Motor Bearings

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Electric motors and generators use a wide variety of bearing types including deep groove ball bearings, angular contact ball bearings, cylindrical roller bearings, spherical roller bearings, CARB toroidal roller bearings and spherical roller thrust bearings. In small horizontal machines, the most common arrangement consists of two deep groove ball bearings. In larger or heavier loaded machines, roller bearings are typically used. In vertical machines deep groove ball bearings, angular contact ball bearings or spherical roller thrust bearings are typically used, depending on the loads, speeds, temperature and environment of the application.

Most of the causes of premature bearing failures can be readily remedied. It is most important to determine the cause of any bearing failure and carry out the prescribed correction before installing the new bearing. Doing so will minimize the possibility of a recurring failure and will work toward maximizing the probability of attaining normal bearing life.

The recent finding is that premature bearing failures can generally be traced back to improper installation or use, improper selection of a bearing for a specific application, or improper lubrication or improper lubricant.